IT IS CLAIMED:

1. A biodetector for the detection of a selected substance comprising:

(a) a signal converting element, comprising an extracellular ligand-specific moiety and an intracellular signal transforming domain, wherein said extracellular ligand-specific moiety selectively recognizes said selected substance, which recognition activates said intracellular signal transforming domain;

(b) a transducer, wherein said transducer has an inactive and an active form which are distinct from each other, and wherein said activated intracellular signal transforming domain converts said inactive form of said transducer into said active form of said transducer;

(c) a responsive element, wherein said responsive element is activated by said active form of said transducer; and

(d) a reporter gene operatively linked to said responsive element, wherein the activated responsive element causes expression of the reporter gene to generate a reporter gene product, resulting in a detectable signal

2. The biodetector of Claim 1, wherein said signal is detected optically.

3. The biodetector of Claim 2, wherein said reporter gene product is detectable by means selected from the group consisting of bioluminescence detection, colorimetric reactions and fluorescence detection.

4. The biodetector of Claim 3, wherein said reporter gene product is bioluminescence.

5. The biodetector of Claim 3, wherein said reporter gene is luciferase.

6. The biodetector of Claim 1, wherein said signal converting element is a fusion protein where the extracellular ligand-specific moiety and the intracellular signal transforming domain are heterologous to one another.

7. The biodetector of Claim 1, wherein said intracellular signal transforming element is derived from a membrane signal transmitter.

8. The biodetector of Claim 7, wherein said membrane signal transmitter is from a bacterial two component regulatory system.

9. The biodetector of Claim 8, wherein said membrane signal transmitter is PhoQ.

10. The biodetector of Claim 9, wherein said responsive element comprises the phoN promoter.

11. The biodetector of Claim 9, wherein said extracellular ligand-specific moiety is an antibody or fragment thereof.

12. The biodetector of Claim 11, wherein said extracellular ligand-specific moiety is a single chain variable fragment (ScFv).

13. The biodetector of Claim 1, wherein said biodetector comprises an intact bacterial cell.

14. The biodetector of Claim 13, wherein said biodetector comprises a Gram-positive bacterial cell.

15. The biodetector of Claim 14, wherein said bacterial cell is selected from the group consisting of *Streptococcus, Staphylococcus, Listeria, Clostridium, Bacillus, and Corynebacteria.*

16. The biodetector of Claim 13, wherein said biodetector comprises a Gram-negative bacterial cell.

17. The biodetector of Claim 16, wherein said bacterial cell is selected from the group consisting of *Escherichia, Salmonella, Pseudomonas, Helicobacter, Shigella, Proteus, Bordetella, Neisseria, Haemophilus, Bacteriodes, Vibrio, Brucella, Campylobacter, Klebsiella, and Yersinia.*

18. A library of biodetectors, comprising

at least about 1000 biodetectors of claim 13, wherein the extracellular ligand-specific moiety of each of said biodetectors comprises a different antibody fragment.

19. An expression vector useful for making a fusion protein for use in a biodetector, comprising

(i) a cloning site for insertion of a DNA fragment encoding an extracellular ligand-specific moiety, and (ii) a first DNA fragment encoding an intracellular signal transforming domain,

wherein said vector is capable of expressing a fusion protein comprising (a) a polypeptide encoded by a DNA sequence inserted at said cloning site, and (b) said intracellular signal transforming domain

20. The vector of claim 19, wherein the vector further comprises, between said cloning site and said first DNA fragment, a second DNA fragment encoding a membrane anchor.

21. The vector of claim 19, wherein the vector further comprises, upstream of said cloning site, a third DNA fragment encoding an N-terminal leader sequence.

22. The vector of claim 19, wherein the vector further comprises, inserted at the cloning site, a fourth DNA fragment encoding an extracellular ligand-specific moiety.

23. The vector of claim 22, wherein the extracellular ligand-specific moiety comprises an antibody fragment.

24. The vector of claim 19, wherein the first DNA fragment encodes a polypeptide comprising the cytoplasmic tail of PhoQ.